mental changes on assimilation and the like, and the influence of psychical impulses and needs relating to the external conditions of life. In both these ways a "somation" (corresponding to a somatic modification of most authors) may arise; it is an ectogenous change in contrast to an autonomous mutation. The endogenous secondary principles, which are also called entropic, include amphimixis and death.

THEORETICAL AND PRACTICAL PHYSICS.

(1) *A Text-book of the Principles of Physics.* By Dr. A. Daniell. New and revised edition. Pp. xxv+819. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1911.) Price 17*s*. net.

(2) *A Textbook of Physics.* By Prof. L. B. Spinney. Pp. xii+605. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1911.) Price 12*s*. net.

(3) *Principles of Physics: Designed for Use as a Text-book of General Physics.* By Prof. W. F. Magie. Pp. ix+570. (London: G. Bell and Sons, Ltd., 1911.) Price 7*s*. 6*d*. net.

(4) *Treatise on Practical Light.* By Dr. R. S. Clay. Pp. xv+519. (London: Macmillan and Co., Ltd., 1911.) Price 10*s*. 6*d*. net.

(1) IT is presumably the duty of a reviewer to try in reading a text-book to take up the point of view of the students for whom it is primarily designed. This attitude it is not at all easy in many cases to assume. But the third edition of Dr. Daniell's text-book scarcely admits of doubt in this respect. Regarded from a purely physical point of view, the book undoubtedly contains much useful information, notwithstanding the fact that it is presented in a peculiarly disjointed fashion. But to propose it as being suitable for medical students seems very misleading. Those who are experienced in teaching medical students, or, at any rate, the majority of them, know with what simplicity the principles of physics must be treated. The subject is one which the students themselves think is foreign to their medical course, and the complexity of detail with which this book abounds would surely make them adhere more strongly than ever to that opinion. But apart altogether from the question of suitability for any special class of students the book is in several other respects open to serious objections. In the first place, the unfortunate tendency in many recent physical text-books of quoting unproved numerous mathematical formulæ is especially prominent in this particular case. This is, in all probability, the main cause of the disjointed nature of the text already referred to. It must be admitted, of course, that such procedure is occasionally inevitable and even desirable, but when it becomes the rule and not the exception, it encourages students to regard physics as a series of formulæ to be committed to memory, and having no logical sequence.

Further, the mode of statement is often peculiarly involved, and sometimes inexact. The latter is illustrated by the statement that "a body free to fall in vacuo would be subject to a constant downward acceleration of about 981 *cm. per sec.*, or 32·2 *feet per sec*"—a statement quite in keeping with the unconvincing way in which the distinctions between velocity and acceleration have been previously treated. The following also is surely a rather extraordinary view to express:—"Kinetic friction is accordingly not a Force; it is a Resistance or Reaction."

The present edition has a supplementary chapter on radio-activity and kindred subjects added. Attention is directed to the chief points in recent work, but the numerical data in connection therewith have scarcely been brought up to date, the old value $3{\cdot}4 \times 10^{-10}$ E.S. being given, for instance, as the unit of electricity. The author has also adopted a uniform notation, and gives an index of symbols at the beginning of the book, but although, in this index, 10^9 is defined as being equal to 1,000,000,000, we frequently find very large numbers expressed in the uncontracted form. The arrangement of the mathematical treatment is also unfortunate from the point of view of facility in reading, being printed in small type, and from line to line, just like the ordinary text.

(2) Prof. Spinney's book will without doubt serve admirably the purpose for which it has been written. In nearly every respect it fulfils the necessary conditions. Being written for engineering and technical students entering upon a course of physics, it deals in a straightforward and logical way with the various sections into which the subject is usually divided. As is to be expected, particular prominence is given to mechanics, the principles of which are illustrated by familiar phenomena and practical contrivances. Although the mathematical treatment is intentionally limited, what is given is exact, and involves no blind learning of formulæ. Also, notwithstanding the professedly elementary character of the work, the author contrives to convey clearly the underlying principles of such subjects as surface tension, kinetic theory of gases, and polarisation of light in a way not often achieved. To each chapter is appended a series of numerical examples; the printing and arrangement of paragraphs and chapters are excellent, and the heavy type used for the more important statements is a distinct gain. The diagrams have evidently been carefully prepared, and are reproduced in a manner quite above the average. To all students desiring a thorough introduction to the science of physics, whether they be engineering students or not, this book can be unhesitatingly recommended.

(3) In some respects this book is unique. On several previous occasions have historical treatises on special parts of physics been published, but no general elementary text-book of physics based upon a historical outline has until now, we believe, appeared. The author's chief reason for adopting this mode of procedure—and it seems to be a good one—is that it directs attention to the lines upon which discovery has proceeded, and trains the mind of the reader in the processes which may lead to further discoveries. Whether this be the case or not, it is certain that the historical treatment makes the subject eminently readable, particularly to those somewhat acquainted already with the principles of physics. From the point of view of the beginner, however, difficulties might arise owing to the historical sequence necessitat-

© 1912 Nature Publishing Group

ing the omission of practice in the application of the physical laws. These difficulties the author has to a large extent surmounted by adding to each chapter a series of worked examples, thus avoiding the introduction of them into the text. Interest is undoubtedly added to the subject by the historical setting, and it is quite possible that students may be induced to regard physics with more favour on account of it. The printing is good, but the diagrams are neither so numerous nor so well produced as they might be. As evidence of the lack in this respect, not one of the four methods of determining the velocity of light is illustrated diagrammatically.

(4) The most surprising feature of Dr. Clay's book on practical light is the fact that considerable space is devoted to pin optics. The size of the book suggests that its scope will cover experiments of a much more elaborate character. This is indeed found to be the case, repetitions by more accurate methods of the rough pin determinations being described at a later stage. As a result the book appears unequal, and the omission of the pin experiments would have been a gain rather than a loss. The ground covered is very extensive, particular attention being paid to the chapters on the compound lens, the microscope and colour, on account of the importance of their industrial applications. Colour, especially, is treated much more fully than is usually the case in text-books of practical physics, and the numerous experiments described in this connection add considerably to the value of the book. The diagrams with which the experiments are illustrated are exceedingly good, so much so that a student, having here before him the perspective view of the arrangement of apparatus, could scarcely fail to set it up correctly without other aid. It may also be pointed out that, with the exception of one, all the diagrams have been specially prepared for this work. The general arrangement of the experiments is normal and logical, and the two appendices, containing useful practical hints, are very desirable. In short, notwithstanding the rather unfortunate inclusion of pin optics referred to, Dr. Clay's book will certainly form a very useful reference work, not only for students of physics, but also for those engaged in industrial applications of the principles of light.

INDIAN FRESH-WATER INVERTEBRATES.

The Fauna of British India, including Ceylon and Burma. Edited by Dr. A. E. Shipley, F.R.S. Fresh-water Sponges, Hydroids, and Polyzoa. By Dr. N. Annandale. Pp. viii+251+v plates. Published under the authority of the Secretary of State for India in Council. (London: Taylor and Francis; Calcutta: Thacker, Spink and Co.; Bombay: Thacker and Co., Ltd.; Berlin: R. Friedländer & Sohn, 1911.) Price 10*s*.

THIS volume differs in some important respects from those that have preceded it in the "Fauna of British India." It is the first of the series to be written entirely in India, and since, as the author very justly remarks, "biological research on Indian animals can only be undertaken in India," it is only fitting that a large part of the volume should be devoted to observations on the bionomics and life-history of the organisms dealt with. It is thus far more than a merely systematic monograph, and contains a great deal that is of interest and importance, not only to the special student of the Indian fauna, but also to the general biologist.

The Indian region is especially rich in fresh-water sponges. Thirty-six species, subspecies, and varieties are enumerated (including three added in the appendix), although on p. 51 the number is given as only twenty-nine, possibly because of doubts as to the systematic or geographical status of some of the forms. Of these no fewer than twenty-two have been discovered and named by Dr. Annandale, who, however, pays a generous and well-merited tribute to the pioneer work in this field of the late Dr. H. J. Carter, of Bombay.

Little is yet known as to the seasonal cycles in the life-histories of fresh-water animals living under tropical conditions, and on this subject Dr. Annandale has many interesting observations. He points out that in temperate regions the approach of winter affects most of the less highly organised inhabitants of fresh waters in the same way, leading to the production of gemmules, statoblasts, and the like, which lie dormant during the unfavourable season. In India, on the other hand, the reaction to seasonal changes is by no means identical, even in closely allied species.

> "Some species flourish chiefly in winter, and enter the quiescent stage at the beginning of the hot weather (that is to say, about March), while others reach their maximum development during the 'rains' (July to September), and as a rule die down during winter, which is the driest as well as the coolest time of the year."

A striking example of specific idiosyncrasy in this respect is given in the case of two sponges, *Spongilla bombayensis and Corvospongilla lapidosa,* found in Bombay. They

> "resemble one another considerably as regards their mode of growth, and are found together on the lower surface of stones. In the month of November, however, *C. lapidosa* is in full vegetative vigour, while *S. bombayensis,* in absolutely identical conditions, is already reduced to a mass of gemmules, having flourished during the 'rains.'"

The Hydrozoa dealt with consist only of two species of Hydra, Dr. Annandale's important discovery of a fresh-water medusa (Limnocnida) in streams of the Western Ghats (NATURE, August 3, 1911) having come too late to be included in this volume. One of the species of Hydra is the familiar and widely distributed *H. vulgaris,* and Dr. Annandale has much that is new to tell regarding the bionomics even of this much-studied animal. Especially interesting is the account of the way in which the larva of a small midge, *Chironomus fasciatipennis,* preys upon Hydra. The larva, which protects itself with a tubular case of silk, entangles the Hydra with a silken thread, and binds it firmly to the outside of the tube, to be afterwards devoured at leisure.

Of Polyzoa about sixteen forms are recognised. One of the most interesting is *Hislopia lacustris,*

© 1912 Nature Publishing Group